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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/776,883	02/11/2004	Thomas C. Coleman JR.	926-70US (P10144)	3390

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ONE COMMERCE SQUARE
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PHILADELPHIA, PA 19103-7013

EXAMINER

PRUCHNIC, STANLEY J

ART UNIT	PAPER NUMBER
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2859

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/776,883

Applicant(s)

COLEMAN, THOMAS C.

Examiner

Stanley J. Pruchnic, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16 is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 14 and 15 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/28/04(1sheet).
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 8, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5447373 A (Okuhara; Seiichi, hereinafter OKUHARA) in view of US 5709474 A (Richardson; David James *et al.*, hereinafter RICHARDSON).

OKUHARA discloses or suggests all the limitations as claimed by Applicant in Claims 1-8, 11 and 12, including the limitations:

Regarding Claim 1: a device for measuring temperature in a metal melt (molten steel 24), comprising an optical fiber (16) connected directly or indirectly (Col. 2, Lines 25-31) to a measurement instrument 21 and held by a carrier (10), the optical fiber (16) having an immersion end which is guided through a melt-consumable body (1; includes paper cylinder 2), wherein the consumable body (1) exhibits a consumption rate in the melt wherein the consumption rate is approximately equal to or greater than a rate at which the optical fiber (2) is destroyed.

Regarding Claims 8 and 12: The consumable body (1) disclosed by OKUHARA is detachably arranged at one end of the carrier (1) as claimed by Applicant in Claim 12; the body 1 includes a paper sleeve 2 and quartz cap 4, and is connected to a detector (transducer 21) of optical pyrometer 21.

OKUHARA as described above, does not explicitly disclose the consumable body (1) exhibits a consumption rate in the melt of at most 10 cm/min as claimed by Applicant in Claim 1, or that the body (1) exhibits a consumption rate of at most 1 cm/minute as claimed by Applicant in Claim 2, the melting point of the body higher than iron and insoluble in molten iron as claimed in Claim 3, and the body including molding sand, etc., as claimed by Applicant in Claim 4, or mechanical stabilizers arranged in the body as claimed by Applicant in Claim 11.

RICHARDSON discloses a consumable refractory sheath for protecting sensors in a molten metal (Col. 2, Lines 8-21). The consumable body (10, the molding sand) disclosed by RICHARDSON has a higher melting point than iron and is insoluble in molten iron, wherein the consumable body (10) comprises at least one material selected from the group consisting of molding sand, refractory cement, and bonded fly ash (molding sand 18) as claimed by Applicant in Claim 4; and wherein mechanical stabilizers (screen 14, staples 16) are arranged in the consumable body (10) as claimed by Applicant in Claim 11 (Col. 3, Lines 5-16).

RICHARDSON further discloses that it is advantageous to use the sheath (1) in order to benefit from thermal protection of a sensing device placed in the molten bath for a period of time long enough to get an accurate reading (Col. 2, Lines 56-67).

RICHARDSON is evidence that ordinary workers in the field of temperature measurement would recognize the benefit of using the reinforced body (10) as taught by RICHARDSON for the body (1) of OKUHARA in order to enable longer measurement time before the sensor is destroyed by the molten metal.

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Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute reinforced body for the paper body of OKUHARA in order to enable longer measurement time before the sensor is destroyed by the molten metal as taught by RICHARDSON.

With respect to the limitations wherein the consumable body (1) exhibits a consumption rate in the melt of at most 10 cm/min as claimed by Applicant in Claim 1, or that the body (1) exhibits a consumption rate of at most 1 cm/minute as claimed by Applicant in Claim 2: the limitations in these claims, absent any criticality, are only considered to be the "optimum" consumption rate of body disclosed by OKUHARA as modified by the teachings of RICHARDSON, as stated above, that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, *etc.* See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the improved melt-consumable body of OKUHARA to provide a consumption rate of at most 10 cm/minute, or at most 1 cm/minute in order to be able to function for the longer times, based on the intended use as taught by RICHARDSON.

3. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over **OKUHARA** and **RICHARDSON** and further in view of US 6004031 A (Takayama; Takamitsu *et al.*, hereinafter **TAKAYAMA**).

To summarize, OKUHARA and RICHARDSON discloses all the limitations of Claims 5-7, as claimed by applicant, as described above regarding Claims 1-4, 8, 11 and 12 in Paragraph 2, except OKUHARA does not explicitly state the materials of the fiber, *i.e.*, being quartz glass, and being at least partially surrounded by a metal tube, *i.e.*, a steel tube, as claimed by Applicant in Claims 5-7.

TAKAYAMA discloses that is known in the art to provide a quartz fiber with a steel covering in order to delay the consumption of the fiber in the case of immersion of the fiber in a molten metal.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide for the fiber of OKUHARA a steel sheathed quartz fiber in order to delay the consumption of the fiber in the case of immersion of the fiber in a molten metal as taught by **TAKAYAMA**.

4. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over **OKUHARA** and **RICHARDSON** and further in view of JP 56-117134 A (**SATO**).

To summarize, OKUHARA and RICHARDSON discloses all the limitations of Claims 9 and 13, as claimed by applicant, as described above regarding Claims 1-4, 8, 11 and 12 in Paragraph 2, except OKUHARA does not disclose the detector is arranged in the consumable body as claimed by Applicant in Claim 9, or that electrical and/or optical signal lines in the consumable body are connected by electrical and/or optical contacts to a connector in the carrier as claimed by Applicant in Claim 13.

SATO discloses that is known in the art to provide a dipping probe with a detector 10 arranged in the carrier part (C; as in Fig. 2) instead of arranging the detector

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10 in the consumable body (probe B; Fig. 1). SATO discloses the optical signal line (quartz rod 3) is connected by an optical contact to a connector in the carrier C, which includes the "pole" 8, enclosing the transducer (detector) 10. The transducer functions as an optical connector as it converts the signal to be carried on the electrical conductor (wire) 11.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to shift the position of the detector of OKUHARA from the outside of the probe to the inside of the consumable body in order to require less optical fiber, by connecting the optical conductor to the electrical conductor at the transducer as taught by **SATO**.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over **OKUHARA** and **RICHARDSON** and further in view of US 5158366 A (Nagai; Nobuyuki *et al.*, hereinafter **NAGAI**).

To summarize, OKUHARA and RICHARDSON discloses all the limitations of Claim 10, as claimed by applicant, as described above regarding Claims 1-4, 8, 11 and 12 in Paragraph 2, except OKUHARA does not disclose the further limitation wherein a consumption sensor is arranged in the consumable body.

NAGAI discloses that is known in the art to provide a device for measuring temperature in a metal melt with a consumption sensor arranged in the consumable body in order to detect erosion in the refractory to discriminate the extent of the consumption of the consumable body 18 (Abstract).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add the consumption sensor arranged in the consumable body of OKUHARA in order to detect erosion in the body to discriminate the extent of the consumption of the consumable body as taught by **NAGAI**.

Allowable Subject Matter

6. Claim 16 is allowed.
7. Claims 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. The following is a statement of reasons for the indication of allowable subject matter:

Regarding Claims 14, 15 and 16: **TAKAYAMA** discloses that it is advantageous to provide an "endless" fiber held by, and movably arranged in, a carrier (e.g., a spool or reel (2)), but this fiber (considering the metallic coating to be the consumable body) is destroyed at a much quicker rate than the consumption rate of the consumable body as claimed by Applicant.

The Prior Art of record does not disclose or fairly suggest the optical fiber is an endless fiber, as claimed by Applicant in **Claim 14**, or that the optical fiber is movably arranged as claimed by Applicant in **Claim 15**, in combination with the other limitations of the respective claims including the limitation wherein the consumable body exhibits a consumption rate in the melt of at most 10 cm/min, and wherein the consumption rate is equal to or greater than a rate at which the fiber is destroyed, as claimed by Applicant.

Regarding **Claim 16**: The Prior Art of record does not disclose or fairly suggest a method for measuring temperature in a metal melt with an optical fiber held by a carrier, wherein an immersion end of the fiber is guided through a melt-consumable body held on the carrier, the method comprising immersing the immersion end of the fiber (2) together with at least one part of a first consumable body (1) at least once into the metal melt, in combination with the other limitations of the claim, including continuously feeding the fiber (2) through a second body (1) as claimed by Applicant.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Regarding a consumption sensor in a consumable body: US 3610601 A (Bishop, Jr.; Harry L.).
- Regarding detachably arranged consumable bodies: JP 02016449 A (YAMATO, TAKAMASA); US 3650414 A (Asada; Yutaka et al.); and US 5180228 A (Tarumi; Yoshihiko et al.).
- Having at least some features in common with applicant's disclosure: US 20030002560; A1 (Yamanaka, Zenkichi et al.); US 6227702 B1 (Yamada; Takeo et al.); US 5733043 A (Yamada; Takeo et al.); US 4468771 A (Zhukov; Leonid F. et al.); US 3763704 A (Blau; Philip et al.); and JP 61246636 A (YONEZAWA, TAKAO et al.).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanley J. Pruchnic, Jr., whose telephone number is **(571) 272-2248**. The examiner can normally be reached on weekdays (Monday through Friday) from 7:30 AM to 4:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. F. Gutierrez can be reached at **(571) 272-2245**.

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The **Official FAX** number for Technology Center 2800 is (703) 872-9306 for **all official communications**.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the official USPTO website at <http://www.uspto.gov/> or you may call the **USPTO Call Center** at **800-786-9199** or 703-308-4357. The Technology Center 2800 Customer Service FAX phone number is (703) 872-9317.

The cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources.

Private PAIR provides external customers Internet-based access to patent application status and history information as well as the ability to view the scanned images of each customer's own application file folder(s).

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1/9/05